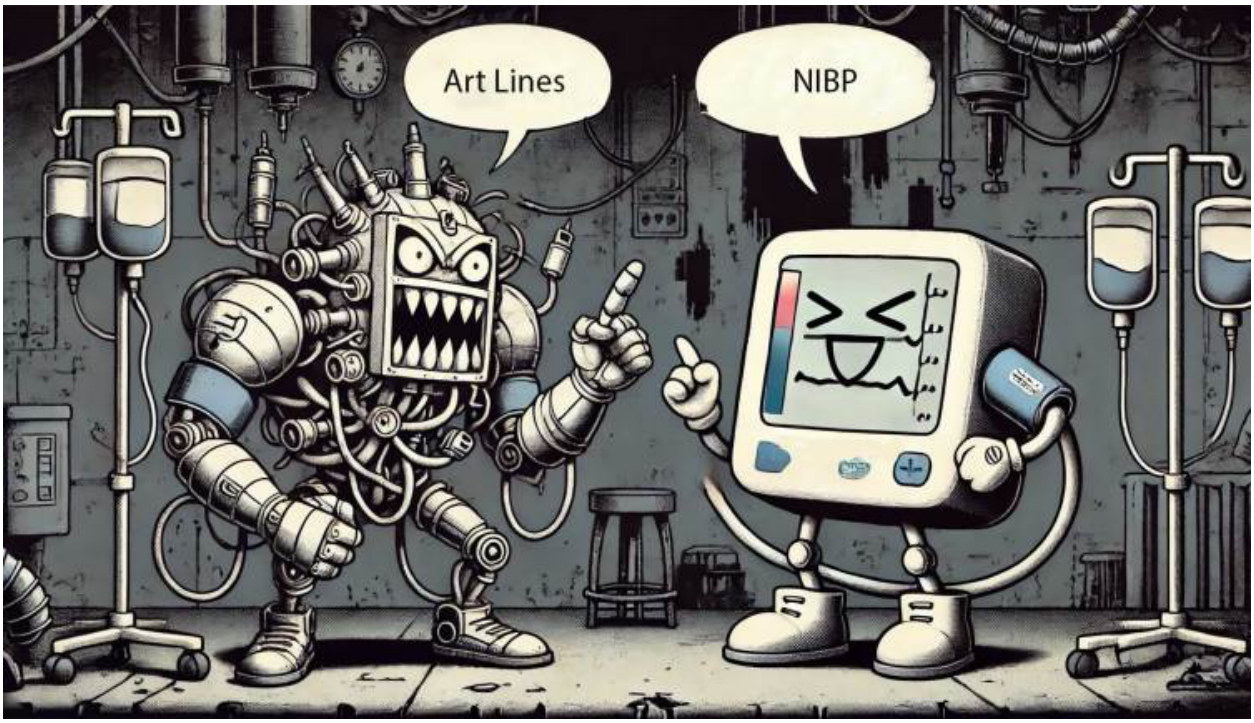
EMCrit 397 – Philosophy of Arterial Lines in the ED – A Debate in Absentia

March 23, 2025 by **Scott Weingart, MD FCCM** 20 Comments



One of the main barometers I use to rapidly characterize an ED as either a resuscitation shop or a standard (read resuscitation sub-standard) ED is are they placing arterial lines.

I have covered all things a-lines in the past:

- Arterial Lines – Part 1
- Arterial Lines – Part 2

Today's show will be a little different. It is a response to comments made on the EM:RAP show in June 2024. I also was sparked to discuss this by a tweet about the show, the PITT, in which an ICU doc said the show was unrealistic b/c they had never been in an ED in which arterial lines were placed.

Necessity Of Arterial Lines

Accuracy

When NIBP Cuffs are Inaccurate

All three- SBP, MAP, and DBP are all measured

Bradycardia only an issue < 40 BPM

Skinny or fat is not an issue unless pt doesn't have the right cuff

Biggest issue is malperfused states or shock, especially with profound peripheral vasoconstriction. Hemorrhagic shock makes a-lines a necessity, with a femoral placement.

Cuff timing q 30 minutes

New Study

Perera et al. Non-invasive versus arterial pressure monitoring in the pre-hospital critical care environment: a paired comparison of concurrently recorded measurements

Prehospital Environment, >2000 paired observations of NIBP and Arterial Line

Bounds of agreement: <20 mmHg for systolic BP (SBP) and diastolic BP (DBP) and <10 mmHg

Only 64% of SBP, 76% of DBP, and 55% of MAP measurements fell within the pre-defined acceptable ranges. NIBP readings tended to overestimate SBP and MAP at low BP values (hypotension) and underestimate these values at high BP values (hypertension). DBP was consistently overestimated across its range.

- **Impact of Hemodynamic Instability**: Hemodynamic shock was associated with lower agreement for SBP (adjusted odds ratio [aOR] 0.52), DBP (aOR 0.65), and MAP (aOR 0.53).
- **Impact of Severe Hypertension**: Severe hypertension was associated with markedly reduced agreement for SBP (aOR 0.17), while DBP and MAP were less affected.
- **Impact of Arterial Catheter Site**: Femoral arterial lines were associated with reduced agreement for MAP (aOR 0.65) compared to radial lines, .
- from St Emlyns' Post

Ability to Real-Time Monitor

It is usually during the resuscitative period, not long-term that a-lines really shine–I still want them long term, obviously.

Opportunity Cost

Nursing

Should already be 1:2 nursing

What about: We have ED nurses, not ICU nurses; they are not trained on how to set-up arterial lines.

See this video for how to set-up a pressure transducer

Docs

Time to Place A-lines

London HEMs experience is 2 minutes. Only get that way if you are good, but this is a transferable skill from ultrasound-guided intravenous lines

Parker Labs Ultradrape & Ultradrape II

Parker Labs

Indication Creep

There never would need to be an indication restriction, so there can't be indication creep

ICU Expectations

This is the one I hear most commonly–I think it is a straw man.

The one that truly galls me is, “If we allow arterial lines, the ICU won't feel the same urgency to get them upstairs!” So if we provide crappy care, the intensivists will doubt our capability of caring for sick patients and rush to get them to a safe place. That is not how I want Emergency Medicine thought of.

Additional New Information

More on EMCrit

- EMCrit 210.1 – Arterial Lines (Part 1)
- EMCrit 210.2 – Arterial Lines – Part 2
- Central Venous Pressure (CVP) and Arterial Line Set-Ups
- EMCrit 332 – Procedural Errors I See at the REANIMATE ECPR Course and How to Place an Intra-Arrest Femoral Arterial Line
- PulmCrit: A-lines in septic shock: the wrist versus the groin(Opens in a new browser tab)